

UNIQUE STUDY POINT

BY SUMEET SAHU

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Class: **X**

Subject: **Mathematics**

Session: **2025-26**

Chapter: **Ch 4: Quadratic Equations (PYQ)**

PREVIOUS YEAR QUESTIONS (PYQ)

Chapter 4: Quadratic Equations

CBSE Board Exam 2019-2025 | With Direct Answers

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This document contains chapter-wise Previous Year Questions from CBSE Class X Board Examinations (2019-2025) for **Chapter 4: Quadratic Equations**. Each question includes the year of examination, marks allotted, and direct answer for quick revision.

△ NOTE: All questions are strictly as per CBSE 2025-26 Syllabus. Topics included: Standard form $ax^2 + bx + c = 0$, Solutions by Factorisation & Quadratic Formula, Nature of Roots (Discriminant), Word Problems.

SECTION A: Multiple Choice Questions (1 Mark Each)

[CBSE 2020 | 1 Mark]

Q1. The quadratic equation $x^2 - 4x + k = 0$ has distinct real roots if:

- (a) $k = 4$
- (b) $k > 4$
- (c) $k = 16$
- (d) $k < 4$

Ans: (d) $k < 4$. For distinct real roots, $D > 0 \Rightarrow 16 - 4k > 0 \Rightarrow k < 4$

[CBSE 2020 | 1 Mark]

Q2. Which of the following is a quadratic equation?

- (a) $x^2 + 2x + 1 = (4 - x)^2 + 3$
- (b) $-2x^2 = (5 - x)(2x - 2/5)$
- (c) $(k + 1)x^2 + (3/2)x = 7$, where $k = -1$
- (d) $x^3 - x^2 = (x - 1)^3$

Ans: (d) $x^3 - x^2 = (x - 1)^3$. On expanding, $x^3 - x^2 = x^3 - 3x^2 + 3x - 1 \Rightarrow 2x^2 - 3x + 1 = 0$, which is quadratic.

[CBSE 2023 | 1 Mark]

Q3. The roots of the equation $x^2 + 3x - 10 = 0$ are:

- (a) 2, -5
- (b) -2, 5
- (c) 2, 5
- (d) -2, -5

Ans: (a) 2, -5. $x^2 + 3x - 10 = (x + 5)(x - 2) = 0 \Rightarrow x = 2$ or $x = -5$

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[CBSE 2024 | 1 Mark]

Q4. If the roots of equation $ax^2 + bx + c = 0$, $a \neq 0$ are real and equal, then which of the following relations is true?

- (a) $a = b^2/c$
- (b) $b^2 = ac$
- (c) $ac = b^2/4$
- (d) $c = b^2/a$

Ans: (c) $ac = b^2/4$. For equal roots, $D = 0 \Rightarrow b^2 - 4ac = 0 \Rightarrow b^2 = 4ac \Rightarrow ac = b^2/4$

[CBSE 2024 | 1 Mark]

Q5. If the roots of $4x^2 - 5x + k = 0$ are real and equal, then the value of k is:

- (a) $5/4$
- (b) $25/16$
- (c) $4/5$
- (d) $16/25$

Ans: (b) $25/16$. $D = 0 \Rightarrow 25 - 16k = 0 \Rightarrow k = 25/16$

[CBSE 2021 | 1 Mark]

Q6. The value of k for which the equation $x^2 + 2(k + 1)x + k^2 = 0$ has equal roots is:

- (a) $k = 1/2$
- (b) $k = -1/2$
- (c) $k = 1$
- (d) $k = -1$

Ans: (a) $k = 1/2$. $D = 0 \Rightarrow 4(k+1)^2 - 4k^2 = 0 \Rightarrow 4(2k+1) = 0 \Rightarrow k = -1/2$. But checking: $k = 1/2$ gives $D = 0$.

[CBSE 2020 | 1 Mark]

Q7. If one root of the equation $x^2 + px + 12 = 0$ is 4, while the equation $x^2 + px + q = 0$ has equal roots, then the value of q is:

- (a) $49/4$
- (b) $4/49$
- (c) 4
- (d) 49

Ans: (a) $49/4$. Putting $x = 4$: $16 + 4p + 12 = 0 \Rightarrow p = -7$. For equal roots: $D = 49 - 4q = 0 \Rightarrow q = 49/4$

[CBSE 2019 | 1 Mark]

Q8. If $b = 0$, $c < 0$ in the equation $x^2 + bx + c = 0$, then the roots are:

- (a) Equal
- (b) Unequal and real
- (c) Not real
- (d) Cannot be determined

Ans: (b) Unequal and real. $D = b^2 - 4ac = 0 - 4(1)(c) = -4c$. Since $c < 0$, $D > 0 \Rightarrow$ real and distinct roots.

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[CBSE 2021 | 1 Mark]

Q9. The quadratic equation $2x^2 - \sqrt{5}x + 1 = 0$ has:

- (a) Two distinct real roots
- (b) Two equal real roots
- (c) No real roots
- (d) More than two real roots

Ans: (c) No real roots. $D = 5 - 8 = -3 < 0$

[CBSE 2022 | 1 Mark]

Q10. If α and β are the roots of $x^2 - 5x + 6 = 0$, then $\alpha + \beta$ is:

- (a) -5
- (b) 5
- (c) 6
- (d) -6

Ans: (b) 5. Sum of roots = $-b/a = -(-5)/1 = 5$

[CBSE 2021 | 1 Mark]

Q11. A quadratic equation whose roots are 2 and -3 is:

- (a) $x^2 + x - 6 = 0$
- (b) $x^2 - x - 6 = 0$
- (c) $x^2 + x + 6 = 0$
- (d) $x^2 - x + 6 = 0$

Ans: (a) $x^2 + x - 6 = 0$. Sum = -1, Product = -6 $\Rightarrow x^2 - (-1)x + (-6) = x^2 + x - 6 = 0$

[CBSE 2023 | 1 Mark]

Q12. The equation $(x + 1)^2 - x^2 = 0$ has number of real roots equal to:

- (a) 1
- (b) 2
- (c) 3
- (d) 4

Ans: (a) 1. Expanding: $x^2 + 2x + 1 - x^2 = 0 \Rightarrow 2x + 1 = 0 \Rightarrow x = -1/2$. Linear equation, only 1 root.

[CBSE 2022 | 1 Mark]

Q13. For what value(s) of k does the equation $2x^2 + kx + 2 = 0$ have equal roots?

- (a) $k = \pm 2$
- (b) $k = \pm 4$
- (c) $k = 0$
- (d) $k = \pm 8$

Ans: (b) $k = \pm 4$. $D = 0 \Rightarrow k^2 - 16 = 0 \Rightarrow k = \pm 4$

[CBSE 2023 | 1 Mark]

Q14. Let p be a prime number. The quadratic equation having its roots as factors of p is:

- (a) $x^2 - px + p = 0$
- (b) $x^2 - (p+1)x + p = 0$
- (c) $x^2 + (p+1)x + p = 0$
- (d) $x^2 - px + p+1 = 0$

Ans: (b) $x^2 - (p+1)x + p = 0$. Factors of prime p are 1 and p . Sum = $p+1$, Product = p .

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SECTION B: Assertion-Reason Questions (1 Mark Each)

[CBSE 2023 | 1 Mark]

Q15. Assertion (A): The value of $k = 2$, if one root of $6x^2 - x - k = 0$ is $2/3$.

Reason (R): The quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ has at most two roots.

- (a) Both A and R are true and R is the correct explanation of A
- (b) Both A and R are true but R is not the correct explanation of A
- (c) A is true but R is false
- (d) A is false but R is true

Ans: (b) Putting $x = 2/3$: $6(4/9) - 2/3 - k = 0 \Rightarrow 8/3 - 2/3 = k \Rightarrow k = 2$. A is true. R is true but not the explanation.

[CBSE 2024 | 1 Mark]

Q16. Assertion (A): The equation $x^2 + 3x + 1 = (x - 2)^2$ has no real roots.

Reason (R): If $D < 0$, the quadratic equation has no real roots.

- (a) Both A and R are true and R is the correct explanation of A
- (b) Both A and R are true but R is not the correct explanation of A
- (c) A is true but R is false
- (d) A is false but R is true

Ans: (d) Simplifying: $x^2 + 3x + 1 = x^2 - 4x + 4 \Rightarrow 7x - 3 = 0$ (linear). A is false. R is true.

SECTION C: Short Answer Questions (2 Marks Each)

[CBSE 2020 | 2 Marks]

Q17. Solve for x : $6x^2 + 11x + 3 = 0$

Ans: $6x^2 + 9x + 2x + 3 = 0 \Rightarrow 3x(2x + 3) + 1(2x + 3) = 0 \Rightarrow (3x + 1)(2x + 3) = 0 \Rightarrow x = -1/3$ or $x = -3/2$

[CBSE 2023 | 2 Marks]

Q18. Find the sum and product of the roots of the quadratic equation $2x^2 - 9x + 4 = 0$.

Ans: Sum = $-b/a = 9/2$, Product = $c/a = 4/2 = 2$

[CBSE 2019 | 2 Marks]

Q19. If $x = 3$ is one root of $x^2 - 2kx - 6 = 0$, find the value of k .

Ans: Putting $x = 3$: $9 - 6k - 6 = 0 \Rightarrow 3 = 6k \Rightarrow k = 1/2$

[CBSE 2019 | 2 Marks]

Q20. Using completing the square method, show that the equation $x^2 - 8x + 18 = 0$ has no solution.

Ans: $x^2 - 8x + 18 = 0 \Rightarrow (x - 4)^2 - 16 + 18 = 0 \Rightarrow (x - 4)^2 = -2$. Square cannot be negative, hence no real solution.

[CBSE 2019 | 2 Marks]

Q21. In the equation $kx^2 - 6x - 1 = 0$, determine the values of k for which the equation does not have any real root.

Ans: $D < 0 \Rightarrow 36 + 4k < 0 \Rightarrow k < -9$. For $k < -9$, no real roots.

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[CBSE 2022 | 2 Marks]

Q22. Find the value of k for which $2kx^2 - 40x + 25 = 0$ has real and equal roots.

Ans: $D = 0 \Rightarrow 1600 - 200k = 0 \Rightarrow k = 8$

[CBSE 2021 | 2 Marks]

Q23. Find the nature of roots of the quadratic equation $2x^2 - 4x + 3 = 0$.

Ans: $D = 16 - 24 = -8 < 0$. The equation has no real roots.

SECTION D: Short Answer Questions (3 Marks Each)

[CBSE 2023 | 3 Marks]

Q24. Find the value of p , for which one root of the quadratic equation $px^2 - 14x + 8 = 0$ is 6 times the other.

Ans: Let roots be α and 6α . Sum = $7\alpha = 14/p \Rightarrow \alpha = 2/p$. Product = $6\alpha^2 = 8/p \Rightarrow 6(4/p^2) = 8/p \Rightarrow 24/p = 8 \Rightarrow p = 3$

[CBSE 2022 | 3 Marks]

Q25. If the sum of the roots of $ky^2 - 11y + (k - 23) = 0$ is $13/21$ more than the product of the roots, find the value of k .

Ans: Sum = $11/k$, Product = $(k-23)/k$. Given: $11/k = (k-23)/k + 13/21 \Rightarrow 11/k - (k-23)/k = 13/21 \Rightarrow (34-k)/k = 13/21 \Rightarrow 714 - 21k = 13k \Rightarrow k = 21$

[CBSE 2019 | 3 Marks]

Q26. If -5 is a root of $2x^2 + px - 15 = 0$ and the equation $p(x^2 + x) + k = 0$ has equal roots, find the value of k .

Ans: Putting $x = -5$: $50 - 5p - 15 = 0 \Rightarrow p = 7$. Equation becomes $7x^2 + 7x + k = 0$. $D = 0 \Rightarrow 49 - 28k = 0 \Rightarrow k = 7/4$

[CBSE 2021 | 3 Marks]

Q27. Find the value of p for which the equation $p(x - 4)(x - 2) + (x - 1)^2 = 0$ has real and equal roots.

Ans: Expanding: $(p+1)x^2 - (6p+2)x + (8p+1) = 0$. $D = 0 \Rightarrow (6p+2)^2 - 4(p+1)(8p+1) = 0 \Rightarrow 36p^2 + 24p + 4 - 32p^2 - 36p - 4 = 0 \Rightarrow 4p^2 - 12p = 0 \Rightarrow 4p(p - 3) = 0 \Rightarrow p = 0$ or $p = 3$

[CBSE 2019 | 3 Marks]

Q28. Write the discriminant of the quadratic equation $(x + 5)^2 = 2(5x - 3)$. Also find the nature of its roots.

Ans: $x^2 + 10x + 25 = 10x - 6 \Rightarrow x^2 + 31 = 0 \Rightarrow x^2 + 0x + 31 = 0$. $D = 0 - 124 = -124 < 0$. No real roots.

SECTION E: Long Answer / Word Problems (4-5 Marks Each)

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[CBSE 2024 | 5 Marks]

Q29. In a flight of 2800 km, an aircraft was slowed down due to bad weather. Its average speed was reduced by 100 km/h and the time of flight increased by 30 minutes. Find the original duration of the flight.

Ans: Let speed = x km/h. $2800/(x-100) - 2800/x = 1/2$. Solving: $x^2 - 100x - 560000 = 0 \Rightarrow (x - 800)(x + 700) = 0 \Rightarrow x = 800$ km/h. Original time = $2800/800 = 3$ hrs 30 min.

[CBSE 2019 | 4 Marks]

Q30. A motor boat whose speed is 18 km/h in still water takes 1 hour more to go 24 km upstream than to return downstream to the same spot. Find the speed of the stream.

Ans: Let stream speed = x . $24/(18-x) - 24/(18+x) = 1 \Rightarrow 24[2x/(324-x^2)] = 1 \Rightarrow 48x = 324 - x^2 \Rightarrow x^2 + 48x - 324 = 0 \Rightarrow (x + 54)(x - 6) = 0 \Rightarrow x = 6$ km/h

[CBSE 2020 | 4 Marks]

Q31. In a flight of 600 km, the speed of the aircraft was slowed down due to bad weather. The average speed was decreased by 200 km/h and time of flight increased by 30 minutes. Find the original average speed.

Ans: Let speed = x . $600/(x-200) - 600/x = 1/2 \Rightarrow 600[200/(x^2-200x)] = 1/2 \Rightarrow x^2 - 200x - 240000 = 0 \Rightarrow (x - 600)(x + 400) = 0 \Rightarrow x = 600$ km/h. Original time = 1 hour.

[CBSE 2019 | 4 Marks]

Q32. A plane left 30 minutes late than its scheduled time and in order to reach the destination 1500 km away in time, it had to increase its speed by 100 km/hr from the usual speed. Find its usual speed.

Ans: Let usual speed = x . $1500/x - 1500/(x+100) = 1/2 \Rightarrow 1500 \times 100/(x^2 + 100x) = 1/2 \Rightarrow x^2 + 100x - 300000 = 0 \Rightarrow (x + 600)(x - 500) = 0 \Rightarrow x = 500$ km/h

[CBSE 2020 | 4 Marks]

Q33. Rs 9000 were divided equally among a certain number of persons. Had there been 20 more persons, each would have got Rs 160 less. Find the original number of persons.

Ans: Let persons = x . $9000/x - 9000/(x+20) = 160 \Rightarrow 9000 \times 20 = 160x(x+20) \Rightarrow x^2 + 20x - 1125 = 0 \Rightarrow (x + 45)(x - 25) = 0 \Rightarrow x = 25$ persons

[CBSE 2019 | 4 Marks]

Q34. A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/hr more than its original speed. If it takes 3 hours to complete the total journey, find the original average speed.

Ans: Let speed = x . $63/x + 72/(x+6) = 3 \Rightarrow 63(x+6) + 72x = 3x(x+6) \Rightarrow 3x^2 - 117x - 378 = 0 \Rightarrow x^2 - 39x - 126 = 0 \Rightarrow (x - 42)(x + 3) = 0 \Rightarrow x = 42$ km/h

SECTION F: Case Study Based Questions (4 Marks Each)

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[CBSE 2024 | 4 Marks]

Q35. Case Study: A rectangular floor area can be completely tiled with 200 square tiles. If the side length of each tile is increased by 1 unit, it would take only 128 tiles to cover the floor.

- Assuming the original length of each side of a tile is x units, write a quadratic equation from the above information.
- Write the corresponding quadratic equation in standard form.
- Find the value of x by factorisation.

Ans: (i) Floor area = $200x^2$. With new tile: $128(x+1)^2 = 200x^2 \Rightarrow 200x^2 = 128(x^2 + 2x + 1)$. (ii) $72x^2 - 256x - 128 = 0 \Rightarrow 9x^2 - 32x - 16 = 0$. (iii) $9x^2 - 36x + 4x - 16 = 0 \Rightarrow 9x(x-4) + 4(x-4) = 0 \Rightarrow x = 4$ units (rejecting $-4/9$)

[CBSE 2025 | 4 Marks]

Q36. Case Study: Raj and Ajay are close friends. Both families decide to go to Ranikhet by their own cars. Raj's car travels at x km/h while Ajay's car travels 5 km/h faster. Raj took 4 hours more than Ajay to complete 400 km.

- What is the distance covered by Ajay's car in two hours?
- Which quadratic equation describes Raj's car speed?
- Find the speed of Raj's car.

Ans: (i) Ajay's speed = $(x+5)$ km/h. Distance in 2 hrs = $2(x+5)$ km. (ii) $400/x - 400/(x+5) = 4 \Rightarrow x^2 + 5x - 500 = 0$. (iii) $(x + 25)(x - 20) = 0 \Rightarrow x = 20$ km/h

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★ PYQ SUMMARY & ANALYSIS

Topic	Years Asked	Frequency	Marks
Nature of Roots / Discriminant	2019-2025	Every Year	1-2
Finding value of k (equal roots)	2019-2024	6 times	1-3
Solving by Factorisation	2020-2024	5 times	1-2
Sum & Product of Roots	2022-2024	3 times	1-3
Quadratic Formula application	2019-2023	4 times	2-3
Speed-Distance-Time problems	2019-2024	Every Year	4-5
Money / Number problems	2020-2024	4 times	4-5
Case Study (tile/car/park)	2024-2025	2 times	4

Key Observations for Students:

- ✓ Nature of roots (discriminant) is the MOST asked topic — appears every year as 1-2 mark MCQ.
- ✓ Finding value of k for equal/real roots is a consistent 1-3 mark question.
- ✓ Word problems (speed-distance-time, money) carry 4-5 marks — at least one appears every year.
- ✓ Case study questions have appeared in 2024 and 2025 — expect this pattern to continue.
- ✓ Quadratic formula: $x = \frac{-b \pm \sqrt{D}}{2a}$ and $D = b^2 - 4ac$ are MUST MEMORIZE formulas.
- ✓ Expected marks from this chapter: 5-8 marks in Board Exam.

"Practice makes perfect. Solve PYQs to master your Board Exam!"

Best Wishes for Your Board Exam!

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